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| 10/672,946      | 09/26/2003  | Takuya Matsumoto     | 8305-233US (61-0002-1) | 9416             |

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ONE COMMERCE SQUARE  
2005 MARKET STREET, SUITE 2200  
PHILADELPHIA, PA 19103

EXAMINER

BERNSHTEYN, MICHAEL

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1713

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/672,946

Applicant(s)

MATSUMOTO ET AL.

Examiner

Michael Bernshteyn

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>September 26, 2003</u> 01108104 | 6) <input type="checkbox"/> Other: ____  |

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## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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1. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer et al. (U.S. Patent 6,136,225) in view of Richard J. Lewis Sr. ("Hawley's Condensed Chemical Dictionary", 14<sup>th</sup> Edition, John Wile & Sons, Inc., NY 2001).

Meyer discloses polymerizable liquid –crystalline compounds of the formula 1, where  $Z^1$  and  $Z^2$  are radicals containing reactive groups via which polymerization can be effected,  $Y^1$ - $Y^4$  re a single chemical bond, oxygen, sulfur, a single covalent bond, -O-CO-, -CO-O-, -O-CO-O-, etc.;  $A^1$  and  $A^2$  are spacers having 2 to 30 carbon atoms in which the carbon chain may be interrupted by ether oxygen, thioether sulfur or by imino or  $C_1$ - $C_4$ -alkylimino groups, M is a mesogenic group and R is  $C_1$ - $C_4$  alkyl (abstract). He discloses that preferred polymerizable groups  $Z^1$  and  $Z^2$  are those, which are susceptible to free radical polymerization, ie. in particular olefinically unsaturated groups and of these acrylic groups are of particular importance in combination with  $Y^1$  and  $Y^2$  (col. 3, lines 5-18).

The above definition of  $Y^1$  and  $Y^2$  fully corresponds to -CO-O- in instant claim 1; the definition of  $A^1$  and  $A^2$  fully corresponds to  $(CH_2)_n$  and  $(CH_2)_m$ ; M is the same mesogenic group because  $P_1$ ,  $P_2$  and  $P_3$  are aromatic moieties (col. 4 - col. 10);  $Y^3$  and  $Y^4$  fully correspond to  $L_1$  -  $L_2$ .

Meyer discloses that  $Z^1$  and  $Z^2$  are independently selected from the groups including acrylic group (col. 3, line 13) and epoxy group (col. 54, lines 4-7).

Meyer does not disclose the specific use of oxetane group.

However, Richard J. Lewis Sr. discloses that an oxetane group ( $=\text{COCH}_2\text{C}=\text{O}$ ) is one kind of epoxy group (page 825). That means the oxetane group taught by Lewis Sr. is specie of epoxy group taught by Meyer.

Therefore, it would have been obvious to one of ordinary skills in the art the invention was made to incorporate an oxatene group as the epoxy group as one of Z group in formula 1 because an ordinary skilled artisan would have expected all species work successfully for the genus. This homopolymerized (meth)acrylic portion creates a side chain-type liquid crystalline polymeric substance.

With regard to the limitations of instant claims 2 and 3, Meyer discloses that it is possible by polymerizing the novel compounds or liquid-crystal compositions to fix the liquid-crystalline ordered state. The polymerization can take place, for example, thermally or photochemically depending on the polymerizable group. It is also possible to copolymerize other monomers with the novel compounds or liquid-crystal compositions. These monomers can be other conventional crosslinkers such as polyvalent acrylates, vinyl compounds or epoxides (col. 21, lines 54-64). This type of polymerization would result in pendant chains after the ethylenic unsaturation of all the monomers are used to polymerize them.

With regard to the limitation of instant claim 4, Meyer discloses that novel liquid crystal compositions contain 10-100% by weight...of compounds I, I and II and/or III, in each case based on the total weight of the liquid crystal composition. In addition, the mixtures may contain 0-90% by weight, preferably 0-50% by weight, of other monomers

like the crosslinkers described hereinafter, and 0-50% by weight, preferably 0-10% of one or more polymerizable or nonpolymerizable chiral compounds (col. 21, lines 48-53).

2. With regard to the limitation of instant claim 5-12, Meyer teaches that his polymerizable compounds are liquid-crystalline compounds and can be used in the same ways as applicant's claims (abstract).

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer et al. and Lewis Sr. as applied to claims 1-4 above, and further in view of Kawasaki et al. (JP 08-020641 and JP 06-308462).

Meyer and Lewis Sr. do not disclose the use of photo cationic initiator for the process of polymerizationthe weight-average molecular weight for side chain-type liquid crystalline polymeric substance and an amount of such substance in a liquid crystal material. Kawasaki discloses that for high-molecular liquid crystal with the main chain consisting of polyoxetane, which is analog for the instant claim 2, the number-average molecular weight is preferably 1000-1,000,000 (JP 08-020641, abstract) and the area ratio of A (a monodisperse ratio): B (a non-monodisperse ratio) is 10:0 to 9:1 (JP 06-308462, abstract).

Therefore, it would have been obvious to one of ordinary skills in the art the invention was made to obtain polymeric liquid-crystalline compositions as taught by Meyer with molecular weight from 2,000 to 1,000,000 and the amount of 10 percent by mass of side-chain type liquid crystalline polymer to a liquid crystal material because Kawasaki teaches these specific embodiments of Meyer's polymeric liquid-crystalline compositions that fall into the generic teaching of Meyer.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer et al. and Lewis Sr. as applied to claims 1-4 above, and further in view of Hammond-Smith et al. (U.S. Patent Application Publication 2003/0104144 A1).

Meyer and Lewis Sr. do not disclose the use of photo cationic initiator for the process of polymerization. Hammond-Smith discloses that when carrying polymerizable **mesogens** and **epoxide** groups, preferably a **cationic polymerization** is used (page 11, [0128], lines 8-10). Therefore, it would have been obvious to one of ordinary skills in the art the invention was made to use **cationic** photoinitiator during the polymerization of Meyer's polymerizable liquid-crystalline compounds in order to obtain the desired polymerization conditions.

Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer et al. and Lewis Sr. as applied to claims 1-4 above, and further in view of Hammond-Smith et al. (U.S. Patent Application Publication 2003/0104144 A1), Prechtl et al. (U.S. Patent 6,712,992) and Hikmet et al. (U.S. Patent 6,171,518).

Meyer discloses that numerous compounds are not converted directly into the liquid, unordered state on warming from the crystalline state with a defined close and long distance ordering of the molecules, but instead pass through a liquid crystalline phase, in which, although the molecules are mobile, the molecule axes form an **ordered structure**. Elongate molecules frequently form **nematic liquid-crystalline phases**, which are characterized by **an alignment long-distance ordering** owing to parallel arrangement of the long axes of the molecules. If a nematic phase of this type contains chiral compounds, a so-called **cholesteric phase** forms, which is characterized by a

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helical superstructure of the long axes of the molecules. The chiral compound here can be the liquid-crystalline compound itself or it can be added to a nematic liquid-crystalline phase as a chiral dope. Liquid-crystalline materials have remarkable **optical properties** based on their **anisotropic ordered state** (col. 1, lines 41-57).

Meyer and Lewis Sr. do not disclose the fixing of orientation by light irradiation and/or heat treatment while producing a liquid crystal film, an optical film, which comprises the liquid crystal film, and a method of producing liquid film.

Hammond-Smith discloses an anisotropic polymer film comprising a polymerized chiral liquid crystal material with helically **twisted structure** and having areas with **different helical twist sense** (abstract). He discloses that the preparation of anisotropic polymer films, wherein the areas of **different twist sense** reflect light of substantially the same reflection colour (page 2, [0031], lines 6-9). He discloses that polymerization of the polymerisable chiral LC material takes place by exposing it to heat or actinic radiation. Actinic radiation means **irradiation with light**, like UV light, IR light or visible light, irradiation with X-rays, or gamma rays or irradiation with high energy particles, such as ions or electrons (page 10, [0127], lines 1—6).

Prechtl also discloses the **optical** component which has been produces using a composition of matter as claimed in claim 1 (claim 11, col. 21, lines 7-8), and a **film** which has been produces using a composition of matter as claimed in claim 1 (claim 13, col. 21, lines 10-11).

Hikmet discloses that optically anisotropic materials can be used to manipulate the characteristics of light beams, such as **polarizable**, direction, intensity, color and



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splitting. Optical elements, which can be made thereof, are, for example, (polarizing) beam splitters, **retardation** plates, (reflective) **polarizer** and compensation foils (col. 1, lines 17-22).

In the absence of showing the criticality, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the orientation state (anisotropic) state of liquid crystal material which contains different groups (phases) of orientation, followed by fixing the orientation by light irradiation and/or heat treatment for producing liquid crystal optical film from Meyer's polymerizable liquid-crystalline compounds in order to obtain the desired remarkable **optical properties** based on their **anisotropic ordered state** (US'225, col. 1 lines 41-57).

Other limitations of monomer content and optical film application are either disclosed or rendered *prima facie* obvious by Meyer et al.

Therefore, all the claims are rendered *prima facie* obvious under 35 U.S.C. 103 from the references cited.

### **Conclusion**

Other references used but not cited in this office include U.S. Patents 6,660,344, 6,656,595, 6,284,898, 6,171,518, 6,088,077, 6,015,848, 5,188,760, JP06-308462, JP08-020641, JP08-301859, JP11-106380 are shown on the Notice of References Cited Form (PTO-892).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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08/18/2005

  
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